In all, we have met with this worm six times; and five of the patients who presented it are dead. It would perhaps be premature to deduce grave consequences from this; and the species is infinitely less abundant than *Anguillula stercoralis*.—*Comptes Rendus*, Feb. 5, 1877, p. 266.

On Filaria hæmatica. By MM. O. Galeb and P. Pourquier.

The authors have dissected more than two hundred dogs in search of this parasite. They cite one of their observations in disproof of the verminous diathesis assumed by some writers. In a pregnant bitch the heart was stuffed with adult *Filariæ*; and its blood showed thousands of embryos, which also occurred in the blood of the fœtus. The mother, therefore, furnishes the starting point for the migrations of the parasites, the embryos which float in the blood of the mother terminating in a slender point which enables these microscopic worms to pierce the tissues and penetrate into the placenta, from which they pass into the circulation of the fœtus.

The identity of the embryos swimming in the blood with *Filaria hæmatica* is proved by the dissection and microscopic examination of the adult female *Filaria*, which shows in the oviduct free embryos exactly like those of the blood. Hence the authors conclude that *Filaria hæmatica* is viviparous.

The adult parasites always reside in the right cavities of the heart or in the pulmonary artery; but their presence in this situation may always be ascertained by the examination of a small portion of the blood of the dog.

The female parasite attains a length of 30–32 centimetres (12 to 12⅘ inches); the male is smaller and more slender, about half the length of the female. More than a hundred of these parasites may exist in the same animal. Sometimes they produce no symptoms, but in other cases cause serious disorders, such as dropsies, which kill the animals. The authors promise a detailed memoir upon this parasite.—*Comptes Rendus*, Feb. 5, 1877, p. 271.

On the Intimate Phenomena of Fecundation.
By M. H. Fol.

The radiate structure of the vitellus has been long since described by various authors. I may cite in chronological order Derbès, who observed it very well in *Echinus*, Gegenbaur in *Sagitta*, Krohn, Leuckart, Kowalewsky, Kupffer in the Ascidia, and, finally, Balbiani in the Araneida. The relations of this structure with cell-division, however, remained unknown, as the authors last cited continued to accept the division pure and simple of the cytoblast. M. Hubert Ludwig has just shown that in this respect the Araneida behave like the Geryonidæ.

A second step of the greatest importance has just been made in

the knowledge of these primordial phenomena. M. O. Hertwig has shown, in his fine memoir on the first development of the Echini, that the spermatozoid penetrates into the ovum, and enters into the composition of the nucleus of the fecundated ovum. I have repeated M. Hertwig's observations and can warrant their correctness, excepting some details which will appear from my own description. The body of the spermatozoid, when it has entered the vitellus, appears to amalgamate with the vitelline protoplasm to form a clear spot, which becomes the centre of a system of radiating striæ. For this spot I adopt the term *pronucleus*, proposed by M. E. van Beneden; and I shall call it the *male pronucleus*. This male pronucleus traverses the vitellus to mingle intimately with a *female pronucleus*, which is situated at the moment of fecundation in the part of the vitellus opposite to that through which the spermatozoid penetrates. Derbès and M. O. Hertwig regard this female pronucleus as identical with the Purkinjean spot of the ovule before its maturity. I reserve my opinion upon this point, which I have been unable to elucidate. From the fusion of these two pronuclei results the nucleus of the fecundated ovum, which is afterwards segmented in the manner described by me in a previous note.

In tracing the development of the *Echinus*, one is struck by the complete absence of any polar corpuscle. This evidently constitutes a very exceptional case in the animal kingdom. In the immense majority of cases the ripe ovule possesses a large germinal vesicle, which only disappears at the moment of fecundation (*Sagitta*), or a little later (*Pterotrachæa*, *Asterias*, &c.). This germinal vesicle is immediately replaced by a system of filaments arranged in a double star, absolutely as in a cell which prepares to divide, only this system is situated quite close to the surface of the ovum. The more peripheral star then issues from the vitellus to constitute a polar corpuscle, which may divide after its escape: most frequently it remains entire, and the star remaining in the interior of the vitellus divides into two stars, one of which issues to constitute the second polar corpuscle. The substance expelled in this manner represents the greater part of the germinal vesicle enveloped by a little vitelline protoplasm. The opinion of Œllacher as to the origin of these corpuscles in the Trout finds a brilliant confirmation in these facts. The last star that remains in the vitellus collects to form a pronucleus.

At this moment I have observed in *Sagitta* and various Gasteropoda a clear spot which forms at the opposite pole of the vitellus. This spot is surrounded, in *Sagitta*, by a star of protoplasmic filaments. It moves in the direction of the spot where the other pronucleus is placed. During this movement of translation we see very clearly, in *Sagitta*, that the centre of the star occurs in front of the clear spot, and that the latter is passively drawn along. On its arrival close to the other pronucleus, hitherto motionless, this star moves more rapidly, the pronucleus is drawn towards the clear spot, and these two elements fuse together to form the nucleus of

the fecundated ovum. These phenomena singularly resemble those observed by M. O. Hertwig and myself in the *Echinus*. If I were to judge of them by analogy, I should say that the clear spot with its star is the male pronucleus; but I have no direct proof of this. MM. Auerbach and Bütschli have already observed this movement of the two vesicles starting from the two opposite poles of the vitellus to become fused together; but M. Auerbach did not perceive that these phenomena only take place after the issue of the polar corpuscles, and M. Bütschli confounds the fusion of the two pronuclei with the amalgamation of the various vacuoles which constitute the female pronucleus.

In *Asterias*, according to the observations of MM. R. Greef, E. van Beneden, and myself, and in the Gasteropoda, the Purkinjean spot dissolves in the germinal vesicle, which in its turn disappears to give place to a double star, which has already been observed by M. Bütschli.

Here we have two distinct cases; and I add a third. In *Dentalium*, according to M. Lacaze-Duthiers, the polar corpuscles effect their escape even before the ovum is fecundated; and in *Asterias*, according to M. R. Greef, the germinal spot and vesicle disappear in the deposited but not fecundated ovum, and the parthenogenetic development of the Starfish only differs by its slowness from the development of the fecundated ovum. M. R. Greef did not observe the formation of two pronuclei; but I have seen them in the fecundated ova of *Asterias*.

Seeking a clue to the interpretation of all these data, we are led to distinguish, in the first place, two well marked cases. In the first case, which is that of *Echinus*, the ovule, at the moment of its deposition, is already destitute of its germinal vesicle, and only possesses a female pronucleus; this becomes, fused, in consequence of fecundation, with a male pronucleus containing the substance of the spermatozoid; and development takes place without previous expulsion of polar corpuscles. In the second case, which is that of the great majority of animals, the ovule, when deposited, still possesses a germinal vesicle and often a germinal spot. These two elements disappear, and the greater part of their substance is expelled from the vitellus in the form of corpuscles, the remainder entering into the composition of a female pronucleus. In the ova which are developed by parthenogenesis, it would appear that this female pronucleus plays the part of a nucleus, and segmentation commences. In the fecundated ova there is formed, at the pole opposite to that at which the female pronucleus is situated, a second pronucleus, which I believe may be regarded as containing the substance of the spermatozoid. These two pronuclei fuse together and the segmentation commences. The principal difference between these two cases would therefore consist in the earlier or later period of the disappearance of the germinal vesicle.

MM. E. van Beneden and Bütschli have already attempted to reduce all these phenomena to a common scheme, but without taking

into consideration the observations of M. O. Hertwig, which they regard as erroneous. My supposition seems to me to refer all the phenomena at present ascertained to a single fundamental process, and not to be contradicted by any known fact.—*Comptes Rendus*, Feb. 5, 1877, p. 268

On the Vitality of certain Land Mollusks. By Robt. E. C. Stearns.

I submit for the inspection of the Academy a living specimen of *Bulimus pallidior*, Sby., one of nine given to me by Prof. George Davidson, who collected them at San José del Cabo, Lower California, in March 1873.

These snails were kept in a box undisturbed until June 23, 1875, when I took them out, and, after examination, placed them in a glass jar with some chickweed and other tender vegetable food, and a small quantity of tepid water, so as to make a warm humid atmosphere. This hospitable treatment induced them to wake up and move about after their long fast and sleep of *two years, two months, and sixteen days.* Subsequently all died but this, which seems to be in pretty good health, though not very active.

It may be remembered that I mentioned before the Academy, at a meeting in March 1867, an instance of vitality, in a snail (*Helix Veatchii*) from Cerros Island, even more remarkable, the latter having lived without food from 1859, the year when it was collected, to March 1865, a period of *six years.*

The famous specimen in the British Museum, which is cited in the books, *Helix desertorum*, had lived within a few days of four years, fastened to a tablet in one of the cases, when discovered to be alive.

Helix desertorum, as the specific name implies, is found in arid and sterile areas in the continents of Africa and Asia, and has, as will be perceived, a wide distribution. From the former continent, I have specimens from Egypt; and it also ranges through Arabia in the latter.

The *Bulimus* from the mainland of the peninsula of Lower California, and *Helix Veatchii* from Cerros or Cedros Island, off the coast on the ocean side of the same, come from within the same physical environment, being comparatively a limited distance apart.

The *Helix* belongs to an interesting and peculiar group, probably varieties of one species, which includes, at present, the following names—(1) *Helix areolata*, Sby., (2) *H. Veatchii*, Newc., (3) *H. pandoræ*, Fbs., and (4) *H. lævis*, Pfr. Other forms geographically approximate may hereafter, on further investigation, be referred to the same lineage.

Of the above, (1) *H. areolata* was the first described; or I should say that this appears by the date to be the first name bestowed upon any member of the group. This species has been quoted from Oregon, and (4) *H. lævis*, from the Columbia river, in both cases erroneously. The figures in 'Land and Freshwater Shells of North